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Social Sciences and Humanities
Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Canada

FEEDING OF CHILDREN.*

By C. G. Havell, M.D.

It would be impossible in a short paper to give a systematic treatment of such a subject as the feeding of children. I propose, therefore, to adopt rather a dogmatic style of dealing with the subject, my remarks being based partly on the teaching of the principal authorities, partly on the results of my own observation and experience.

I need not enlarge upon the practical importance of the subject. To anyone it must always appear a question of the greatest moment as a matter of national hygiene, while to members of the P.N.E.U., whose object it is "to learn how to give intelligent supervision and guidance to the development of their children's whole nature," it must always be a problem of first-rate interest. Indeed, I rather fear I have selected a subject so often thrashed out by you that it will not be easy to avoid being trite or wearying you with details you are all very well acquainted with.

A medical man may, however, be excused for calling you away for a brief hour from the investigation of problems of the higher education. Most of his work among children lies in correcting faults of feeding and their consequences, while mind and character will blossom the finer for being cultivated in a healthy little animal.

The life of the child may be divided from a dietetic point of view into three epochs. The first, from birth to primary dentition; the second, from beginning of first dentition to second dentition; the third, from the commencement of second dentition to puberty.

I offer this not as an exact subdivision, but as a convenient generalisation by which child-life can be arranged in periods, each characterised by special directions of growth and each therefore requiring special modifications of nutrient elements. In the first period, of say six months, the child will more than double its weight. In the second, of seven years, it will have reached about 3½ stone, making an average gain of 7 lbs. a year; in the third period the gain is at the rate of about 5 lbs. a year, so that between 13 and 14 the child will weigh approximately 6 stone. If growth has been maintained at the same rate as during the first period cited, the child would weigh at 14 not six stone but 14½ stone.

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* Paper read before the Ipswich Branch P.N.E.U.

The food, therefore, by which this wonderful output of energy is to be accomplished is worthy of some consideration.

Let us first compare it with food composing a standard adult dietary. I say a standard dietary because unlike children adults can exist and even thrive on a diet of a very limited assortment of elements. Esquimaux for instance live largely on fat; we are credibly informed that as much as 20 lbs. of flesh and blubber can be eaten in one day; the North American mixed races eat nothing much but meat, Indians rice, and so on. But the standard adult dietaries are based upon a certain definite proportion of food elements. Foods as you need scarcely be reminded, in addition to water and salts, contain as their principal elements:—*Proteids*, represented by flesh of meat, white of egg, and gluten of wheat; *carbo-hydrates*, represented by starch and sugar; and *fats*. Of these various elements it is found that the amount required daily by an adult is—

Proteid	125 grammes
Carbo-hydrate	500 ,,
Fat	50 ,,

In other words the proportion of proteid to carbo-hydrates and fat, taken together, is roughly one to five.

Now for our comparison; milk, the food agent which doubled our baby's weight in six months, contains all the elements enumerated above, combined in certain proportions. The ordinary infant of six months consuming the usual amount of milk, I am speaking of human milk, will get from it roughly the following amount of nutritive material per diem:—

Proteid	14 grammes
Fat	30 ,,
Carbo-hydrates	60 ,,

The striking fact of the comparison is that while the baby requires only about one-ninth part the proteid and carbo-hydrate of a full-grown man, he actually gets more than half the fat. We learn, therefore, that fat is the element of food most concerned in stage of rapid growth. A similar proportion obtains in the milk of all animals, not in human milk only.

There can be no doubt that fat serves not merely a dynamical but a vital purpose in the nutrition of young growing animals, and indeed of all cell growth. Examine milk under a microscope and you will see nothing at first but little round globules of fat: yet, despite the fact that milk is a rich emulsion of fat, one constantly sees little children placed on a diet of artificial foods which are almost destitute of this vital element.*

I need not address a homily to members of the P.N.E.U. of the importance to both mother and child of the latter having its natural sustenance. Apart from all questions of health, it would be interesting to work out the enormous social results which would accrue supposing henceforward all mothers nursed their own infants. I am quite certain that nothing but good could come of it. There is no calculating on the evil results which follow from one single step away from the natural methods and natural law, and a mother little knows the tangled skein she often first begins to weave when she decides that momentous question "Shall I nurse the baby?" in the negative.

There are a few legitimate reasons for not doing so—ill health of the mother, deficient supply, the fact that the mother is the bread-winner of the family, and so on. But I fear there are many illegitimate reasons sought and found. In my experience the officiousness and self-confidence of some monthly nurses is a fertile reason. I do not speak of the best and most soundly trained of their class. But there is a large section of monthly nurses, bursting with a sense of their own importance, and not having the good balance imparted by general culture, who make a point of recommending mothers either not to nurse at all, or who seize upon and exaggerate every little difficulty which may be found at the commencement of nursing, to dissuade them from persevering in the sometimes difficult task. There are some people to whom the ways of nature are not paths of pleasantness and peace, who love to parade a little knowledge and to display a fussy juggling with sterilizing or humanizing milk, patent bottles and foods. The mother, too feeble to make any resistance to the blandishment of the nurse, allows the tyranny of the bottle to be substituted for the sweet domesticity of her own rule, little knowing the retribution which is often in store for her as soon as the nurse's "month is up." Another very common plea is that the mother's milk does not seem to agree with the baby. At any rate the frying-pan is a safer place than the fire. If the mother's milk does not seem to suit, believe me that in ninety-nine cases out of a hundred it will do so far better than a cow's, or the much advertised products of the food factory.

But, unfortunately, there will always be a certain number of cases in which the cow will have to be resorted to. It will be well to spend a few minutes in inquiring how the latter's milk differs from human and how its difference may be best adjusted. The most important difference is a vital one. You may so treat cow's milk that the exact proportion of nutrient elements of proteid, fat and carbo-hydrate may be presented to the baby as exist in human milk. But you will never overcome the grave difficulty that the proteid element in human milk consists more of albumen than of casein or cheese, while in cow's, however treated, the reverse is the case. Consequently the curd yielded by the latter is a dense clot, while the curd of human milk is loose, friable, and easily broken up.

There is much diversity of opinion as to the exact proportion of the nutritive elements in human milk. The proportion of proteid, for instance, varies from .9 to 3.5 per cent., according to the analyst. I do not suppose, however, that you wish to be burdened with many figures. It will suffice to say that, besides the vital difference just now mentioned, cow's milk is richer in proteid, mineral matter and (to a less degree) in fat; human milk excels in sugar. Therefore the problem presented in assimilating cow's to human milk is to reduce the curd and mineral matter, to leave the fat much as it was, and increase the amount of sugar. You are all acquainted with the usual way of doing this, dilution with varying amounts of water and adding sugar. The objection is that the poor little stomach is overfilled with a useless quantity of water. Instead of a pint, which is all it requires as far as mere nutriment goes, it will have to dispose of three pints if you try to get in the equivalent of the dilution. Without discussing further the various processes of dilution, I must unhesitatingly express my preference for the treatment of the milk by what is known as the "humanizing" process. As I propose later on to give a demonstration of this process, I need not further describe it. Suffice it to say that the facility it affords for regulating the proportion of nutrient elements, and at the same time keeping the bulk of the food within natural limits, more than outweighs the slightly increased trouble of preparing it.

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* Cheadle, *Artificial Feeding of Infants*.

Such slaves are we to custom that the notion that there is any other animal than the cow worthy of comparison with it as a source of milk will come as a surprise to some people. Yet if claims derived from usage from a hoary antiquity compared with which the cow is a modern innovation, and the fact that whole nations still depend upon this quadruped for the milk supply warrant a respectful consideration, surely the goat has a claim on our attention. Writers on the subject generally dismiss the goat in a sentence. Cheadle, for instance, says, "Now goat's milk is excellent food for children." Hutchinson is equally laconic but bluntly condemnatory; he says, "Goat's milk is a strong milk, stronger even than cow's, and in no way suited for use in infancy."

But I should like to give you the direct experience of an intelligent mother, who has actually kept a goat for the purpose. She says, "Baby commenced to have goat's milk when she was five months and ten days old. At first I put a table-spoonful of water and one of lime-water and a scrap of sugar to a bottle of milk, but for some time she has had it pure with one table-spoonful of lime-water to the bottle.

"I saw in Dr. Cheadle's book that he says, 'goat's milk coagulates in large masses like cow's,' but that is not my experience. If any was rejected (a rare occurrence), it was always in the form of soft flakes like human milk, quite odourless, never in cheesy lumps like cow's. I think there is an opening for a new industry in England, that of goat keeping, as the milk seems to be very suitable for infants; but people are so ignorant and prejudiced, and say it tastes strong.

"It does not from a properly fed goat kept separate. The hornless nanny is the best milker, large framed with big udders, and she should not have her first kid till she is two years old. Mine is at least 7½ years old, and she has given more milk than ever this summer. I reckon that during the milking period from the end of April to the end of November she costs 4*s*. 8*d*. a month, or 1*s*. 2*d*. a week, that is, she consumes a week:—

Oats, one gal.	..	6*d*.
Beans ,,	..	1½*d*.
Oil Cake, 1 lb.	..	2*d*.
Hay and grain	..	4½*d*.
		1*s* 2*d*.

"She also has the house scraps, tea leaves, potato parings, etc.; but if she were ever turned out into a good meadow she would not want nearly as much. A feed of bran and oats morning and night would be sufficient. In the winter, I give her scarcely anything but hay, she eats a truss a month, with an occasional meal of bran and oats. Total for the year, £2 7*s*. 8*d*. Then she is tethered every day in good weather on the waste ground outside and picks up what she can, cost nothing. She gave for four months three pints a day, two months two pints, and then a little less until I dry her off at the end of November."

To this practical demonstration of the advantages of the goat I would add that the milk, passing as it does through not more than two pairs of hands before use, resembles mother's milk in being practically sterile. There is the further security that the goat unlike the cow is practically immune to tubercular disease. To anyone therefore favourably situated near a meadow or a bit of common, I can safely urge the claim of the goat as a source of children's food. I ought perhaps to warn you that a single goat loose in a garden can work more mischief in half an hour than a jobbing gardener in a month. A rose bed can be browsed into brambles in a few minutes.

We are still dealing with the first epoch of the child's career, and I suppose I must say something about those substitutes for a mother's milk which come not from nature's laboratory, but from the chemist's. I will not waste many sentences over them. A mother once yielding to the blandishments of the advertisement of the patent food maker is like a sheep tender of Queensland, who, to take what he fancies is a short cut, gets off the beaten track and too often becomes hopelessly "bushed." She experiments with one food after another, sometimes several different ones in a week, and soon gets into a helpless bewilderment. I should prefer to label them all dangerous and pass on to the consideration of the second dietetic period.

PERIOD II.

This period is signalised by two events of first-rate physiological importance, the eruption of teeth and the capacity for digesting starch. With nature so obligingly indicating the way, we cannot do better than follow her lead, and add to baby's food farinaceous food, and as soon as the gums have lost their tenderness, employ the newly acquired teeth in the purpose for which they were created. A thousand and one forms of farinaceous food with varying amounts of converted and unchanged starch are available. Of them all I prefer to begin with Chapman's entire wheat flour. It is said to contain some "cerealin" which has the property of converting starch into dextrine and maltose; it is fairly rich also in albuminates, fats, and the necessary mineral substances, as in its composition the pollard or outer parts of the grain are retained. The staple diet is still of course milk, and at this age the baby is, or should be, quite capable of digesting and assimilating cow's milk pure. Those babies who are privileged to draw nature's supply of pure, health-giving, tissue-building food are, if possible, nursed solely by the mother up to the eighth month, and after that partially to the end of the first year. You will remember the baby of six months required—

Proteid ..	14 grammes.	
Fat	30 ,,	
Carbo-hydrates ..	60 ,,	per diem.

It is computed that at eighteen months these proportions must be increased to—

Proteid ..	42 grammes.
Fat	35 ,,
Carbo-hydrates ..	100 ,,

It will be observed that the proteids are just three times as much as the six-months' baby required, the fat about the same, and the carbo-hydrates as 100 to 60. A few words as to the sources from which these different ingredients are to be derived. Milk is the chief source of the *proteid*, and may be supplemented, at the end of the first year, by small quantities of yolk of egg, to which chicken, fish, and a little underdone meat is gradually added. Fat should be derived from good milk, butter, and yolk of egg. The importance of fat as an aid to growth has already been insisted upon. Too much pains therefore cannot be taken to educate the child in this respect. The chief thing to observe is that it must be given in a state of fine division.

Thus butter or dripping spread on bread or mixed with mashed potatoes will always be taken when more solid fat would be refused. The source of the carbo-hydrates has already been indicated, and after the first year the more solid starchy food may be given. Biscuits or rusks have the advantage over bread, because "the high degree of heat to

which they have been subjected ruptures the starch grains and converts part of their contents into soluble forms."[*] Sugar is also one of the most important sources of carbo-hydrate: so important indeed from its cheapness that it is doubtful if the result of the recent war will be of such advantage to the rising generation as to justify the Chancellor of the Exchequer in making them help to pay for it. Hutchinson[†] gives some interesting observations on the comparative values of jam and butter. He says that it requires three pounds of jam to be equal in nutritive value to one pound of butter, and at current prices the difference in cost is slightly in favour of butter. But he also observes that in actual use it takes five pounds of jam to go as far as a pound of butter, so that the housewife will always find the former more costly than the latter.

I have said nothing so far as to the *mineral matters* which the growing bones of the child require in building. The fact is that if the rules already laid down are observed an ample mineral supply is obtained from the milk, which is rich in lime, potash and phosphoric acid. The vegetable salts of potash, which occur in abundance in fruit and green vegetables, are also of importance, and such articles should always find a place in the child's menu at this period.

A child of ten months will require five meals a day.[‡] The first at 7 a.m., of Chapman's flour and milk, with perhaps a table-spoonful of a malted food, such as Mellin's. The second at 10.30, a breakfast cup of sweetened warm milk, in which a table-spoonful of barley jelly is dissolved. The third at 1.30, the yolk of one egg beaten up in a cup of sweetened milk. The fourth at 5 p.m., the same as the second. The fifth at 11 p.m., the same as the first.

From twelve to eighteen months the same number of meals may be given. The first at 7.30, stale bread or rusk and milk. The second at 10.30, a drink of milk, with thin bread and butter or biscuit. The third at 1.30, a teacup of good beef tea or gravy, with rusk or some light farinaceous pudding. The fourth and fifth as before. The teeth may be further exercised with a crust of dry bread. The mid-day meal may already be a good deal varied as, for instance, a boiled mashed potato with beef tea or gravy, followed by some junket.

(To be continued)

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[*] Hutchinson, *Food and Dietetics*. 1901. Page 455. [†] Op. cit., page 133.

[‡] These examples are taken from *The Wasting Diseases of Children*, Dr. Eustace Smith.